Contribution ID: **358** Type: **Poster**

# A Monolithic Active Pixel Sensor for the Upgrade of the ALICE ITS

ALICE is the LHC experiment dedicated to the study of the properties of the Quark-Gluon Plasma in nucleus-nucleus interactions at LHC energies.
In order to improve the ALICE physics capabilities, the apparatus will be substantially upgraded during the LHC Long Shutdown 2 (LS2). In particular, the Inner Tracking System will be replaced by a new detector based on an innovative radiation tolerant monolithic active pixel sensor (MAPS) of recent conception, whose R&D is now well advanced.
This talk will focus on the first large scale pixel chip prototype, ALPIDE (ALice PIxel DEtector), developed with this new technology, which is one of the options for the new ITS. As peculiar to MAPS, the pixel chip integrates in the same substrate both the sensing diode elements and the Front End Electronics with 28 um pixel pitch.
The use of a monolithic pixel sensor allows to achieve very little material budget in the tracking layers, which can be as low as X/X0=0.3% for those closest to the interaction point. The FEE is designed in the 180 nm CMOS TowerJazz technology taking advantage of deep p-well implants. The deep p-well implants allow to reduce significantly the charge collection competition between PMOS transistors and sensing diodes, and allow to have smaller readout circuitry, which can then be placed inside each pixel.
The pixel sensor has a data driven readout architecture based on in-pixel discrimination and on a priority-encoding scheme, which makes it compatible with the 50 KHz interaction rate foreseen for Pb-Pb at the LHC.

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**Track Classification:** Experiments: 2a) Experiments & Upgrades